

CLIMATE CHANGE RESILIENT HOUSING DESIGNS FOR FARMERS IN RURAL SYLHET

INTRODUCTION

Global population growth and the increasing frequency of extreme weather events are intensifying rural-urban migration, creating overcrowded cities with declining living standards. This research aims to identify specific interventions to improve rural living conditions in Bangladesh, thereby slowing down urbanization processes and setting an example for other regions facing similar challenges.

Bangladesh, “one of the most climate-vulnerable countries in the world”, has endured over 200 extreme weather events in the past two decades, most of which were floods, cyclones and storms¹. Meanwhile, the country contains an extremely large and continuously growing population, which creates a high density in urban as well as rural areas. According to Tasneem Chowdhury, a Bangladeshi architect, his country was among the least urbanized nations worldwide in 1992². Simultaneously Charles Correa observed a rapid trend of urbanization in *developing* countries in 1989³. Consequently, a large rural population that migrates quickly into urban areas resulted in overcrowded cities. According to Correa this rapid urbanization led migrants into overcrowded informal settlements with poor living standards, which allowed them to have access to job opportunities that were mostly located in city centres⁴.

These observations align with those of Rana and Ilina (2021), who illustrated how rural poverty is shifted into urban poverty in Bangladesh⁵. They noted that by 2007, only about half of the households in Dhaka had access to health facilities and the city’s water supply infrastructure was inadequate to meet the demand⁶.

Correa identified economic instability as a primary driver of rural-urban migration⁷. This global mechanism can be observed in Bangladesh where rural populations face inadequate infrastructures, limited income sources and are disproportionately affected by

¹ Bairagi et al., ‘Flood-Tolerant Rice Improves Climate Resilience, Profitability, and Household Consumption in Bangladesh’. Page 1

² Chowdhury, ‘Segregation of Women in Islamic Cultures and Its Reflection in Housing: A Study of Spaces for Women in a Bangladesh Village’. P. 338

³ Correa, *The New Landscape*. Page 10

⁴ Correa. Page 17

⁵ Md Rana and Ilina, ‘Climate Change and Migration Impacts on Cities: Lessons from Bangladesh’. Page 2

⁶ World Bank, ‘Dhaka: Improving Living Conditions for the Urban Poor’. Cited in ‘Climate Change and Migration Impacts on Cities: Lessons from Bangladesh’. Page 5

⁷ Correa, *The New Landscape*. Page 17

extreme weather events⁸. This combination of factors destabilizes rural economies and often leaves migration as the only option for those seeking to improve their quality of life.

LITERATURE REVIEW

The literature relevant to this research highlights the interconnected issues of climate-induced rural-urban migration and economic vulnerability in agricultural communities. Additionally, multiple sources provide insights into resilient housing and farming strategies that counter the impact of flooding events. In the following the interdependencies of these findings will be examined and remaining research gaps will be highlighted.

Urbanization and Rural-Urban Migration

In *The New Landscape* (1989)⁹ Charles Correa offers fundamental insights into urbanization patterns in *developing* countries, coherent with the developments in Bangladesh. He identifies economic instability as a significant driver of rural-urban migration¹⁰. He describes how this process often results in informal settlements¹¹, where living standards remain low, and offers alternative urban design strategies to integrate migrating people into the urban fabric¹². Correa's work suggests that creating job opportunities in rural areas could slow migration by addressing poverty at its origin.

Rana and Ilina expand on this by examining how climate-induced migration transforms rural poverty into urban poverty by leading into informal urban settlements with a lack of access to essential resources and infrastructures¹³. They state a clear causality between extreme weather events and waves of migration¹⁴. This suggests the need of rural resilience to reduce pressures on urban areas.

⁸ Baishakhy, Islam, and Kamruzzaman, 'Overcoming Barriers to Adapt Rice Farming to Recurring Flash Floods'. Page 5

⁹ Correa, *The New Landscape*.

¹⁰ Correa. Page 17

¹¹ Correa. Page 17

¹² Correa. Page 17

¹³ Md Rana and Ilina, 'Climate Change and Migration Impacts on Cities: Lessons from Bangladesh'.

¹⁴ Md Rana and Ilina. Page 3

Climate Change effects on Housing and Agriculture in Bangladesh

Climate change increases the frequency and severity of extreme weather events, disproportionately affecting vulnerable regions like rural Bangladesh. In *Overcoming barriers to adapt rice farming to recurring flash floods*, Baishakhy, Islam, and Kamruzzaman (2023) illustrate how climate change is increasing the frequency of extreme flooding events (flash floods) that cause affected farmers to lose up to 80% of their crops¹⁵. They emphasize that the economic impact of such crop losses disproportionately affects smallholder farmers¹⁶, which highlights the urgent need for resilient agricultural strategies to prevent rural economic destabilization.

Socio-economic vulnerabilities in rural farming communities

Baishakhy, Islam, and Kamruzzaman (2023) identified several vulnerabilities faced by rural farmers in Bangladesh. These include limited access to flood-resistant crop varieties, inadequate training in climate change-resilient farming practices, and lack of sufficient storage facilities that protect crops during floods¹⁷. These factors weaken agricultural productivity and increase economic instability, often resulting in migration to urban areas as outlined by Rana and Ilina in *Climate change and migration impacts on cities: Lessons from Bangladesh* (2021)¹⁸. The literature points to a clear need for interventions that stabilize rural economies and enhance resilience to climate change. This research addresses the need for an approach that enhances both housing and farming resilience with the goal of creating economically independent rural communities less vulnerable to migration pressures.

Climate-resilient Housing strategies

Neil Noble (2012) documents existing design strategies used in traditional Bangladeshi housing to mitigate the effects of regular flooding levels¹⁹, such as elevated storage spaces and plinths that raise buildings by 30-40 cm²⁰. He also describes how erosion-resistant plants like bamboo and banana are planted around buildings to prevent soil erosions²¹. However, according to Noble, these strategies are often insufficient to protect

¹⁵ Baishakhy, Islam, and Kamruzzaman, 'Overcoming Barriers to Adapt Rice Farming to Recurring Flash Floods'. Page 2

¹⁶ Baishakhy, Islam, and Kamruzzaman. Page 2

¹⁷ Bairagi et al., 'Flood-Tolerant Rice Improves Climate Resilience, Profitability, and Household Consumption in Bangladesh'. Page 5

¹⁸ Md Rana and Ilina, 'Climate Change and Migration Impacts on Cities: Lessons from Bangladesh'.

¹⁹ Noble, 'Flood Resistant Housing Low-Cost Disaster-Resistant Housing in Bangladesh'.

²⁰ Noble. Page 1

²¹ Noble. Page 1

against severe flash floods. He suggests that the incorporation of additional measures such as using more durable materials²² and increasing elevation²³, could improve housing resilience. This research will build on Noble's findings by assessing how these strategies could be enhanced for greater resilience in flood-prone areas and for rising sea-levels in the future.

Community Resilience and the Role of Social Environments

Michael Ungar's research (2013) on resilience emphasizes that social environments play a crucial role in protecting individuals and communities against extreme events.²⁴. Although his work is not directly connected to housing design, it highlights the importance of community cohesion and local cultural integration. In the context of this research these findings support the need to respect and incorporate traditional living practices in the development of resilient housing for rural Bangladesh.

Identified research Gaps

The presented literature has not yet fully explored how climate-resilient housing design and agricultural practices could be developed as a dual strategy to reduce rural economic instability and thereby rural-urban migration. While existing housing strategies often address regular flood levels, they do not yet account for the severity of flash floods.

PROBLEM STATEMENT

Economic instability has been identified as a primary driver of rural-urban migration²⁵ in Bangladesh, where annual monsoon seasons and floods strain rural communities²⁶, and climate change intensifies these challenges with more frequent extreme weather events. Especially the north-east region of the country, the Haor Wetlands, is affected by a high flood risk, and serves as an example of an area where traditional housing designs reach their limits. These common structures include elevated plinths and easily repairable elements made of rather cheap materials²⁷, yet these designs are not sufficient to

²² Noble. Page 2

²³ Noble. Page 3

²⁴ Ungar, 'Resilience, Trauma, Context, and Culture'. Page 255

²⁵ Correa, *The New Landscape*. Page 17

²⁶ Baishakhy, Islam, and Kamruzzaman, 'Overcoming Barriers to Adapt Rice Farming to Recurring Flash Floods'. Page 2

²⁷ Noble, 'Flood Resistant Housing Low-Cost Disaster-Resistant Housing in Bangladesh'. Page 2

withstand the force of severe flash flood events, which often cause immense destruction²⁸. Due to the reliance on low-cost materials with less durability, economically disadvantaged rural communities often must rebuild their houses after each monsoon season²⁹. This necessity for yearly reparations continuously decreases the economic stability of already disadvantaged populations³⁰.

However, the weather conditions not only affect the housing situation but also the agriculture. Bangladesh is a “predominantly agriculture-based country”³¹ that relies immensely on rice farming for its food supply and as a source of income³². While crop losses of around 4% of the annual rice production due to flood events is considered a normal rate³³, these crop losses naturally affect smallholder farmers stronger and weaken their economic stability once more³⁴. However, climate change is now increasing the frequency of the occurrence of flash flood events, which can cause crop losses of up to 80% at a time³⁵.

Combined with the damage these floods cause on their dwellings, these events result in extreme economic burdens that leads many residents to seek greater economic stability in urban areas, despite the overcrowded and resource-limited conditions of cities like Dhaka. According to Rana and Ilina the “total number of urban slums are increasing after every occasion of natural disasters”³⁶. Therefore, by speeding up the urbanization the reoccurring climate disasters contribute to the overpopulation of cities in Bangladesh which results in formation of slums and a decrease of living standards in many cities. This results in an urgent need for strategies that improve both housing resilience and economic stability in rural communities, creating conditions that allow people to sustain their livelihoods without needing to migrate.

²⁸ Morshed, ‘The Politics of Self-Help’. Page 12

²⁹ Noble, ‘Flood Resistant Housing Low-Cost Disaster-Resistant Housing in Bangladesh’. Page 1

³⁰ Noble. Page 5

³¹ Baishakhy, Islam, and Kamruzzaman, ‘Overcoming Barriers to Adapt Rice Farming to Recurring Flash Floods’. Page 1

³² Baishakhy, Islam, and Kamruzzaman. Page 1

³³ Bairagi et al., ‘Flood-Tolerant Rice Improves Climate Resilience, Profitability, and Household Consumption in Bangladesh’. Cited in Baishakhy, Islam, und Kamruzzaman Page Page 2

³⁴ Baishakhy, Islam, and Kamruzzaman, ‘Overcoming Barriers to Adapt Rice Farming to Recurring Flash Floods’. Page 2

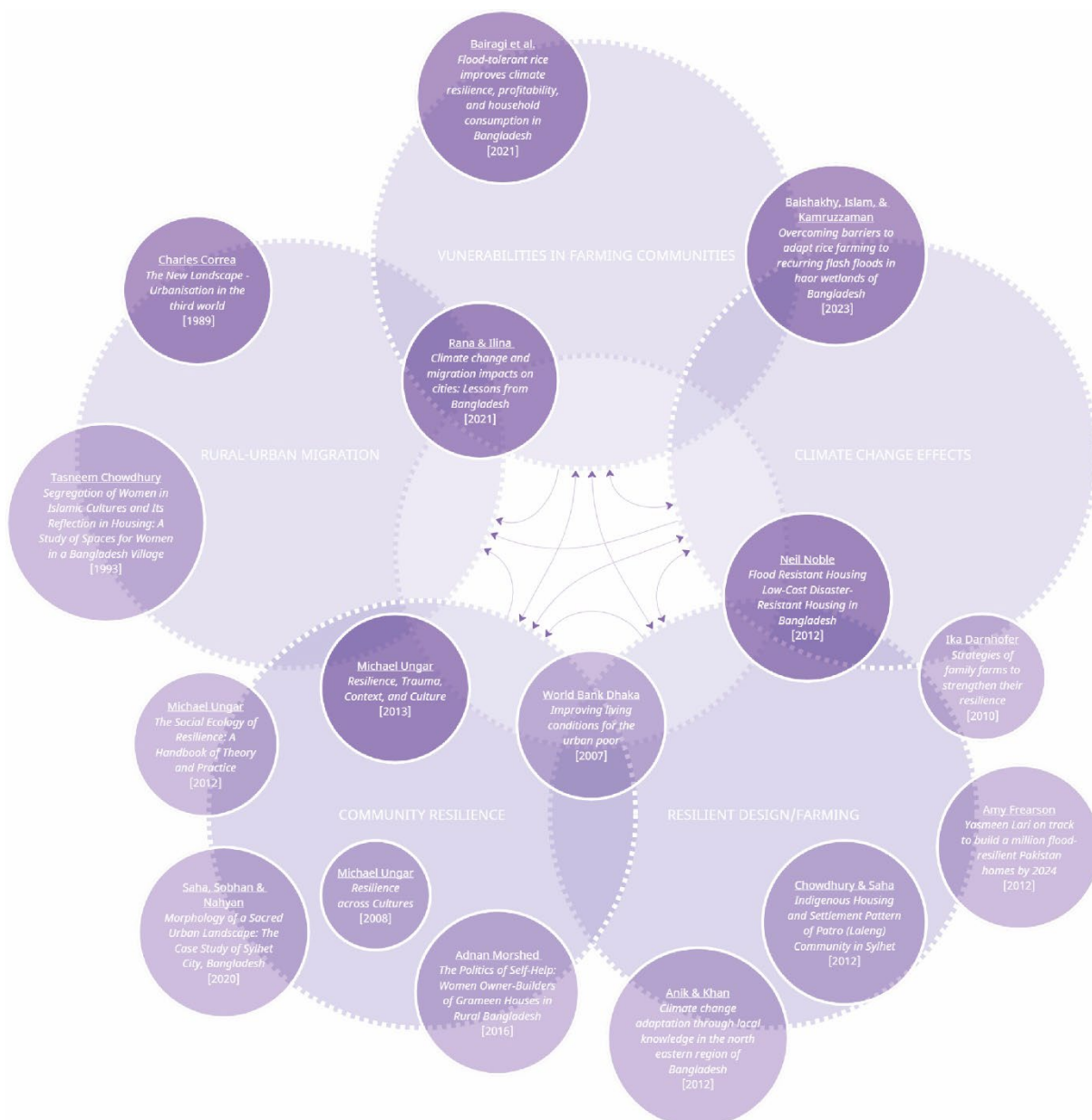
³⁵ Baishakhy, Islam, and Kamruzzaman. Page 2

³⁶ Md Rana and Ilina, ‘Climate Change and Migration Impacts on Cities: Lessons from Bangladesh’. Page 3

RESEARCH GOAL

This research seeks to develop housing and farming strategies that account for the severity of flash floods by identifying strategies that combine resilient housing and farming practices to create an integrated design, offering a potential model for rural stability. By enhancing economic stability and housing resilience, this study aims to reduce migration pressures, contributing both to local solutions and global models for sustainable rural development.

THEORETICAL FRAMEWORK



RESEARCH QUESTION

How can housing in rural Sylhet integrate **climate change-resilient design and farming strategies** to enhance the **economic stability of local farmers** and reduce **migration pressures** while respecting **traditional living practices**?

1. Which climate-resilient housing and farming strategies are currently in use and which strategies from other regions could be adapted for this area?
2. How can these strategies be combined into a sustainable housing design that respects existing living practices and mitigates the risks posed by flash floods?
3. Which additional infrastructures can be incorporated to support the economic stability of local farmers?

DESIGN HYPOTHESIS

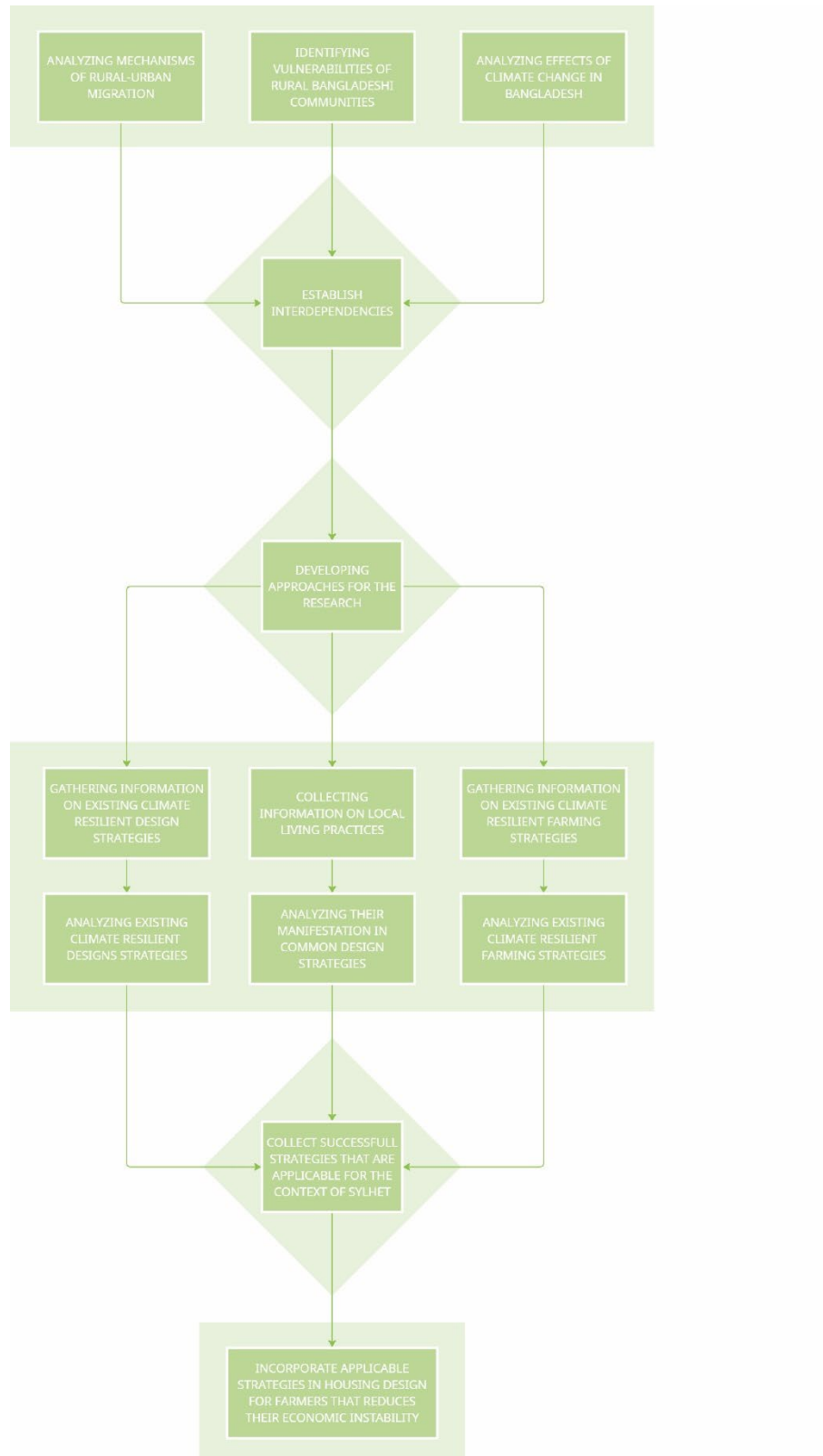
An integrated climate-resilient design for housing and farming can enhance the economic independence of local farmers and potentially reduce migration to urban areas. This hypothesis will guide the design process, allowing for adjustments based on empirical findings.

METHODS

This research will employ the following methods:

- Data Collection: Gathering detailed information on existing climate-resilient housing and farming strategies from both local and global contexts
 - ➔ Output: catalogue of strategies that could inform the design
- Analysis: Conducting a comparative analysis of case studies from both local and global contexts that aim to improve rural resilience to identify effective strategies that can be adapted to Sylhet.
 - ➔ Output: catalogue that documents the advantages/disadvantages of the different strategies
- Design and Simulation: Developing and testing housing models that integrate resilience features suitable for Sylhet's environmental conditions.

RESEARCH SCHEME



RELEVANCE

This research addresses the immediate and long-term impacts of climate change on rural migration in Bangladesh. While Bangladesh faces specific challenges, the research outcomes may be applicable to similar flood-prone regions. By providing rural communities with sustainable alternatives to migration, the study offers potential benefits for urban centres, which are struggling to accommodate growing populations in resource-constrained environments. This approach aligns with global efforts to create sustainable, climate-resilient models for rural areas affected by climate-induced migration.

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